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BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Application Number: 10/606,358
Filing Date: June 26, 2003
Appellant(s): KIKUCHI ET AL.

Andrew D. Meikle
For Appellants

EXAMINER'S ANSWER

This is in response to the appeal brief filed 10-16-06 appealing from the Office action mailed 5-16-06.

(1) Real Party in Interest

A statement identifying by name the real party in interest is contained in the brief.

(2) Related Appeals and Interferences

The examiner is not aware of any related appeals, interferences, or judicial proceedings which will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

(3) Status of Claims

The statement of the status of claims contained in the brief is correct.

(4) Status of Amendments After Final

The appellant's statement of the status of amendments after final rejection contained in the brief is correct.

No after final amendment has been filed after the Final Rejection mailed 5-16-06.

(5) Summary of Claimed Subject Matter

The summary of claimed subject matter contained in the brief is substantially correct. In particular, the summary of the claimed subject matter is correct except for an obvious typographical error. All occurrences of "sharp" in the summary of the claimed subject matter should be --short--. In the description of the claimed subject matter of claim 1, for example, "sharp glass fiber" (next to last line on page 5 of Brief filed 10-16-06) should be --short glass fiber--.

(6) Grounds of Rejection to be Reviewed on Appeal

The appellant's statement of the grounds of rejection to be reviewed on appeal is substantially correct. The changes are as follows: "Ichida" should be --Uchida--. The grounds of rejection to be reviewed on appeal is correctly stated below:

Whether claims 1, 9 and 12 are unpatentable under 35 U.S.C. 103(a) over Uchida (EP 1,0724,46) in view of Marzocchi 059 (US 3,364,059) and Marzocchi 280 (US 3,620,280).

(7) Claims Appendix

The copy of the appealed claims contained in the Appendix to the brief is correct. It is noted that claim 1 in the Appendix to the brief filed 10-16-06 correctly recites "short glass fiber".

(8) Evidence Relied Upon

EP 1,072,446	Uchida	1-2001
US 3,364,059	Marzocchi 059	1-1968
US 3,620,280	Marzocchi 280	11-1971

Uchida, directed to the tire art, discloses a studless tire having a tread comprising diene rubber and short glass fibers dispersed in the diene rubber so as to be oriented in the tread thickness direction, wherein when measured at 25°C, the tread has a ratio of complex elastic modulus E1 in the tread thickness direction and complex elastic modulus E2 in the tire circumferential direction of $1.1 \leq E1/E2 \leq 4$ and a tread rubber hardness measured at -10°C of 45 to 75 degrees. In invention example 1, the braking performance on ice is 125.

Marzocchi 059, directed to glass fiber elastomeric systems, teaches that the development of a strong and permanent bonding relationship between glass fibers and rubber is faced by a number of problems such as the non-porous smooth surface of glass fibers. Marzocchi 059 teaches treating glass fibers with

mercaptan-containing organo silane anchoring agent to obtain a strong bond between the glass fibers and rubber so that the glass fibers are better able to contribute their properties to products fabricated thereof.

Marzocchi 280, directed to the tire art, discloses treating glass filaments with an anchoring agent such as a mercapto substituted organoalkyoxy silane, wrapping the treated glass filaments around an organic core to form composite cord, chopping the composite cord to form short composite cords and forming a tire having a tread comprising rubber and short composite cords.

(9) Grounds of Rejection

The following ground(s) of rejection are applicable to the appealed claims:

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1, 9 and 12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Uchida (EP 1,072,446) in view of Marzocchi 059 (US 3,364,059) and Marzocchi 280 (US 3,620,280).[1]

Uchida, directed to a tire which improves or balances adhesion, adhesion friction, digging friction, scratching friction and abrasion resistance, and has excellent performance on ice and snow covered roads, discloses a studless tire having a tread comprising diene rubber and short glass fibers dispersed in the diene rubber so as to be oriented in the tread thickness direction, wherein when measured at 25°C, the tread has

[1] On page 8 of the Brief filed 10-16-06, appellants refer to "the four references relied upon by the Examiner". This remark is incorrect. Only three references (Uchida, Marzocchi 059 and Marzocchi 280) are relied upon by the examiner in the 103 rejection.

a ratio of complex elastic modulus E1 in the tread thickness direction and complex elastic modulus E2 in the tire circumferential direction of $1.1 \leq E1/E2 \leq 4$ and a tread rubber hardness measured at -10°C of 45 to 75 degrees. The glass fibers have an average fiber diameter of 1-100 micrometers (preferable 3-50 micrometers) and an average length of 0.1-5 mm (preferably 0.1-3 mm). See abstract and paragraphs 6-21 and example 1. In paragraph 13, Uchida teaches that the thickness oriented short fibers form portions having locally high ground contact pressure for pushing away water film generated between the frozen road and the tire surface. Uchida also teaches that adhesion and adhesion friction are improved, and digging and scratching friction are also improved at the same time. In paragraph 16, Uchida teaches that the desired effect of pushing away the water film is deteriorated if the fibers drop from the tread surface during running. Therefore, Uchida expresses a desire for the fibers to remain bound to the rubber of the tread to prevent the fibers from dropping from the tread surface during running and thereby prevent deterioration of the effect of pushing the water film generated between the frozen road surface and the tire surface (paragraphs 13, 16). In invention example 1, the braking performance on ice is 125. Uchida substantially discloses the claimed invention except for surface treating the short glass fibers.

Marzocchi 059, directed to glass fiber elastomeric systems, teaches that the development of a strong and permanent bonding relationship between glass fibers and elastomeric materials is faced with a number of problems which are peculiar to glass fibers. Glass fibers are non-porous and have smooth surfaces. Elastomeric materials

are unable to achieve anchorage and are unable to establish a strong grip on the smooth surfaces. Furthermore, the smooth surfaces are dominated by groups which impart hydrophilic characteristics whereby the glass fiber surfaces are preferentially receptive to moisture by comparison with elastomeric materials. As a result, any bonding relationship that is capable of being established between such materials is markedly diminished by the water film that immediately forms to separate the elastomeric material from the glass fiber surfaces in the presence of moisture. Marzocchi 059 teaches improving the bonding relationship of glass fibers with rubber by treating the glass fibers with a mercaptan-containing organo silane anchoring agent ("sulfur containing mercaptosilane"). Marzocchi 059's anchoring agent, which comprises "Si" and "-SH" (the mercapto group), is represented by the formula $R_nSiX_{(4-n)}$. Marzocchi 059 teaches that a strong bonding relationship between the glass fibers and the elastomeric material is retained even in the presence of moisture. Marzocchi 059 teaches that the glass fibers are better able to contribute their properties to products fabricated thereof when a strong and permanent bonding relationship is developed between the glass fibers and the elastomeric material. See columns 1 and 2. Marzocchi 059 teaches that the glass fibers may be continuous glass fibers, staple glass fibers or chopped glass fibers (col. 2 lines 34-44). Marzocchi 059 teaches that the elastomer includes natural rubber (a diene rubber) and synthetic rubber. See col. 2 lines 45-49.

Marzocchi 280, directed to the tire art, discloses treating glass filaments with an anchoring agent such as mercapto substituted organoalkoxy silane ("sulfur containing

mercapto silane") and then manufacturing a composite cord by wrapping the treated glass filaments around an organic core. Marzocchi 280 teaches a pneumatic tire having a tread comprising rubber and short composite cords 83. The short composite cord has a length such as 1/8 inch (3.1 mm). The short composite cords were obtained by chopping the composite cord to short lengths. See figure 5, columns 4 and 5 and especially col. 5 lines 57-68.

As to claim 1, it would have been obvious to one of ordinary skill in the art to treat the short glass fibers of Uchida with an anchoring agent (surface treating agent) comprising sulfur containing mercaptosilane to improve adhesion of the short glass fibers to the rubber of the tire tread since (1) Uchida expresses a desire for the glass fibers to remain bound to the rubber of the tread to prevent the glass fibers from dropping from the tread surface so as to prevent deterioration of the effect of pushing the water film generated between the frozen road surface and the tire surface (paragraphs 13, 16) and (2) the secondary art to Marzocchi 059 and Marzocchi 280 provide ample motivation (strong bond between glass fibers and rubber even in the presence of moisture) to treat Uchida's glass fibers for a rubber tire tread with an anchoring agent comprising sulfur containing mercapto silane.

As to claims 9 and 12, Uchida's glass fibers have an average fiber diameter of 1-100 micrometers (preferable 3-50 micrometers) and an average length of 0.1-5 mm (preferably 0.1-3 mm).

(10) Response to Argument

With reference to the graph presented on page 8 of the Brief filed 10-16-06, appellants argue that one skilled in the art would not arrive at the conclusion of the advantageous results that can be achieved by a combination of the surface treatment of the non-metal short fibers and the orientation of the fibers in the tread thickness direction. No unexpected results commensurate in scope with the claims have been shown.

First: Appellant's graph compares Uchida's comparative example 3 having a braking performance on ice of 105 with appellant's comparative example 3 having a braking performance of 105. This comparison is irrelevant since (1) Uchida teaches orienting the glass fibers in the thickness direction of the tread and (2) neither Uchida's comparative example 3 nor appellant's comparative example 3 are for a tire tread having glass fibers oriented in the thickness direction.

Second: Appellant's graph compares appellant's comparative example 2 having a braking performance of 115 and appellant's example 1 having a braking performance of 127. Although *appellants* included the braking performance on ice for Uchida's comparative example 3 in the graph on page 8 of the Brief filed 10-16-06, appellants failed to include the braking performance on ice of 125 for Uchida's invention example 1 in the graph on page 8 of the Brief filed 10-16-06. A breaking performance on ice of 127 for appellant's example 1 is not seen as being unexpected over a breaking performance on ice of 125 for Uchida's example 1. It is acknowledged that the braking performance of 127 for appellant's example 1 is higher than the braking performance of

115 for appellant's comparative example 2. However, both of these examples use 20 parts paraffin oil whereas Uchida's example 1 uses 25 parts paraffin oil. Results based on the use of 20 parts paraffin oil are not commensurate in scope with claim 1 since claim 1 fails to specific any amount of paraffin oil.

Appellants argue that Uchida fails to disclose the use of a surface treating agent. Examiner agrees that Uchida is silent as to the use of a surface treating agent. However, the secondary art to Marzocchi 059 and Marzocchi 280 provide ample motivation (strong bond between glass fibers and rubber even in the presence of moisture) to treat Uchida's glass fibers for a rubber tire tread with an anchoring agent comprising sulfur containing mercapto silane. See col. 2 lines 51-72 of Marzocchi 059. Forming a strong bond between the short glass fibers and rubber in Uchida's tire tread is consistent with Uchida's teaching that the short glass fibers should not drop from the tread during running. See paragraph 16 of Uchida.

Appellants state that Uchida "... appears to achieve its desired anchoring of the fibers in the rubber material by controlling the diameter of the fibers as well as the length of the fibers." (page 10 of Brief filed 10-16-06). Examiner agrees that Uchida desires anchoring the glass fibers in the rubber such that the fibers do not fall out of the rubber. Furthermore, the secondary art to Marzocchi 059 and Marzocchi 280 provide ample motivation (strong bond between glass fibers and rubber even in the presence of moisture) to treat Uchida's glass fibers for a rubber tire tread with an anchoring agent comprising sulfur containing mercapto silane.

Appellants argue that "... a close reading or the Ichida reference [Uchida reference] reveals that there is no suggestion for the fibers to remain bound to the rubber of the tread ..." (page 11 of Brief filed 10-16-06, emphasis in original). This argument is not persuasive. First: This argument is apparently inconsistent with appellant's other argument that Uchida "... appears to achieve its desired anchoring of the fibers in the rubber material by controlling the diameter of the fibers as well as the length of the fibers." (page 10 of Brief filed 10-16-06, emphasis added). Second: If the fibers drop from the tread, then there are no longer bound to the rubber of the tread. Uchida teaches away from a tread in which the glass fibers separate from the tread during running. See paragraph 16 of Uchida.

Appellants argue that Uchida is not looking to solve the problem of separation of the glass fibers from the rubber material. This argument is not persuasive. Uchida incorporates glass fibers in rubber. Marzocchi 059 recognizes that the development of a strong and permanent bonding relationship between glass fibers and rubber is faced by a number of problems which are peculiar to glass fibers. Marzocchi 059 informs one of ordinary skill in the art that the non-porous smooth surfaces of glass fibers prevent establishment of a strong grip between the glass fibers and elastomeric material. Marzocchi 059 teaches preventing separation of glass fibers from elastomeric material by treating glass fibers with a mercaptan-containing organo silane anchoring agent before incorporating the glass fibers in rubber. See column 2 lines 10-15, 50-71 of Marzocchi 059. Prevention of separation of glass fibers from rubber is desired by

Uchida because Uchida teaches that the glass fibers should not drop from the tread surface during running. See paragraph 16 of Uchida.

Appellants argue that Marzocchi 059 does not suggest the use of glass fibers in a studless tire. More properly, Marzocchi 059, like Uchida, uses glass fibers in rubber and appraises one of ordinary skill in the art of the well known problem of anchoring glass fibers in rubber. Marzocchi 059 motivates one of ordinary skill in the art to treat the glass fibers with an anchoring agent ("sulfur containing mercaptosilane") to obtain a strong bond between the glass fibers and the rubber so that that the glass fibers are better able to contribute their properties to products fabricated with glass fibers.

Appellants argue that Marzocchi 059 does not contemplate orienting glass fibers in the thickness direction of the tread. This argument is not persuasive since the subject matter of orienting glass fibers in the thickness direction of the tread is disclosed by Uchida. See Uchida's figure 1(b), which is the same as appellant's figure 1(b).

Appellants argue that it would not be obvious to combine the teachings of Uchida and Marzocchi 059 since Uchida is not looking to solve the problem of separation of glass fibers from rubber and Marzocchi 059 does not suggest using glass fibers in tire treads. With respect to this non-analogous art argument, Uchida and Marzocchi 059 are analogous art since (1) Uchida and Marzocchi 059 are in the same general field of endeavor of glass fiber elastomeric systems and (2) Uchida and Marzocchi 059 desire a product comprising rubber and glass fibers wherein the glass fibers do not separate from the rubber.

Appellants argue and examiner agrees that Marzocchi 280 teaches forming a yarn by wrapping a glass filament about an organic core, chopping the yarn into short lengths and incorporating the short lengths in tread rubber such that the short lengths are randomly oriented. However, examiner adds that Marzocchi 280 treats the glass filament with an anchoring agent in the form of "sulfur containing mercapto silane" before incorporating the short lengths in the tread rubber. See col. 5 lines 55-58 of Marzocchi 280. Furthermore, Uchida incorporates radially oriented glass fibers in tread rubber and Marzocchi 059 and Marzocchi 280 make it apparent to one of ordinary skill in the art that glass fibers should be treated with "sulfur containing mercapto silane" when incorporated in rubber. This is true even when glass fibers are used in a tire tread. See Marzocchi 280.

Appellants argue that the claimed invention exhibits unexpected results of improved braking properties and abrasion resistance properties as evidenced by examples and comparative examples of the specification. The examples in the specification have been considered but are not persuasive of obviousness since (1) Uchida, directed to a tire tread comprising radially oriented glass fibers and having improved braking performance on ice and abrasion resistance, teaches preventing the fibers from dropping from the tread surface so that the fibers can push water away, improve adhesion friction, digging and scratching friction and (2) Marzocchi 059 and Marzocchi 280 motivate one of ordinary skill in the art to use the claimed surface treating agent on Uchida' glass fibers to form a strong bond between the glass fibers and rubber and retain this strong bond even in the presence of water. It is emphasized

that Uchida's tire with radially oriented short glass fibers in the rubber tread has improved braking performance on ice and improved abrasion resistance (e.g. compared with comparative example 3) and that the secondary art strongly motivates one of ordinary skill in the art to treat glass fibers with an anchoring agent to deal with the well known problem of bonding glass fibers to rubber. The results of braking properties and abrasion resistance naturally flow from Uchida's teaching to use radially / thickness oriented glass fibers in tread rubber to improve braking properties and abrasion resistance and the secondary art's teaching to use an anchoring agent to improve the bond between glass fibers and rubber and thereby obtain fuller utilization of the desirable properties of the glass fiber component. See col. 2 lines 16-71 and col. 3 lines 1-20 of Marzocchi 059. No unexpected results has been shown for treating the glass fibers using "sulfur containing mercapto silane" instead of treating the glass fibers using some other anchoring agent.

Appellants' comparative example 1 (no short fibers), comparative example 3 (improper fiber orientation) and comparative examples 4 and 5 (elastic modulus and tread hardness not achieved) fail to compare the invention with the closest prior art (Uchida) because Uchida's tire tread has short fibers, the claimed fiber orientation, the claimed ratio E1 :E2 of 1.1 to 4 and the claimed hardness of 45-75 degrees.

With respect to comparative example 2, a breaking performance on ice of 127 for appellants' example 1 is not seen as being unexpected over a breaking performance on ice of 125 for Uchida's example 1. Also, glass fiber B for appellants' example 1 is described as treated by "sulfur containing mercaptosilane". A specific compound is not

identified. Compare the specific compounds described in Marzocchi 059 with the general description of "sulfur containing mercaptosilane" for glass fiber B of appellants' example 1.

When all of the evidence is considered, including the teachings of the applied prior art (e.g. Uchida's disclosure of braking performance of 125 for tire tread having thickness direction oriented glass fibers in rubber, Marzocchi 059's teaching to use a mercaptan-containing organo silane anchoring agent to obtain a strong and permanent bond between glass fibers and rubber) and the totality of the rebuttal evidence (e.g. examples in appellant's specification), it is examiner's opinion that, on balance and in light of the scope of the present claims, the rebuttal evidence fails to outweigh the evidence of obviousness.

(11) Related Proceeding(s) Appendix

No decision rendered by a court or the Board is identified by the examiner in the Related Appeals and Interferences section of this examiner's answer.

For the above reasons, it is believed that the rejections should be sustained.

Respectfully submitted,

Steven D Maki 12-20-06

STEVEN D. MAKI
PRIMARY EXAMINER

Steven D. Maki
December 20, 2006

Conferees:

Richard Crispino

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